PA-2400

Software Manual

(Version 1.00)

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Casio Computer Co., Ltd.

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1. Overview

This manual gives the specifications of the software that operates on the H/PC (Casio PA-2400). The H/PC uses the Windows CE US Ver 2.0 operating system.
The Casio PA-2400 is the next model up from the PA-2100 (CASSIOPEIA Pen Version with Japanese-language OS Ver1.01) .
This H/PC has been developed for export. It has pen input capability and is based on the CASSIOPEIA Key Version for export, which is the generic consumer model that is similar to the Japanese-language Ver1.01 model.

1.1 Features

This H/PC has the open-plat form OS of Windows CE US Ver 2.0 (by Microsoft Corporation) pre-installed.

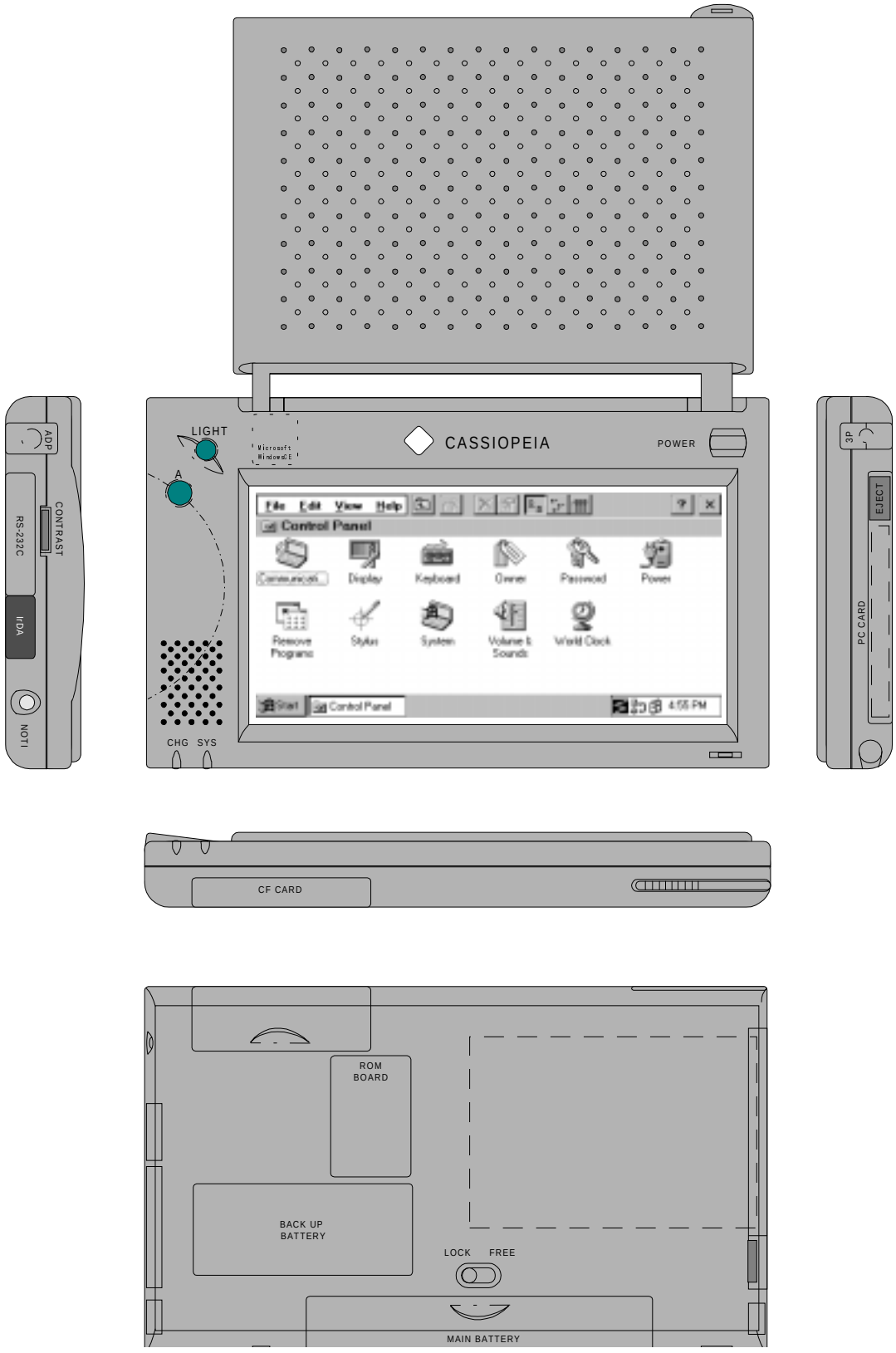
Table 1.1 Comparison

Item	Windows CE Ver 2.0	Windows CE Ver 1.01
1. OS environment	Network compatible * Print function added. Sound and backlight controllable from OS	
2. Font	True type font	Raster font
3. Concurrent use of multiple cards	Concurrent use of Compact Flash and PC Card (SRAM, ATA) (Storage Card and Storage Card2) First card inserted is identified as the Storage Card. If two cards are inserted simultaneously, CF is identified as the Storage Card.	Can not be used concurrently Substituted by a system that uses a Linear Flash Card
4. Application	Enhanced Pocket Word, Excel, IE, etc. Pocket PowerPoint Inbox with file attachment capability Enhanced Pocket Office (Zoom capability, etc., added) Enhanced Pocket Outlook (Ink capability, etc., added)	Pocket Word, Excel, etc.
5. Expandable Memory	Expandable to maximum of 43 MB (Main memory: 8 MB/CF: 15 MB /ATA: 20 MB)	Expandable to maximum of 28 MB (Main memory: 8 MB/ ATA 20 MB)
6. AP development environment	Visual C++ Ver5.0 and Windows CE SDK , Visual Basic Ver5.0, or Visual J++ Ver1.1	Visual C++ Ver5.0 and Windows CE SDK

Note: * LAN Card is available.

1.2 External View

Fig. 1.1 External View



1.3 Specifications

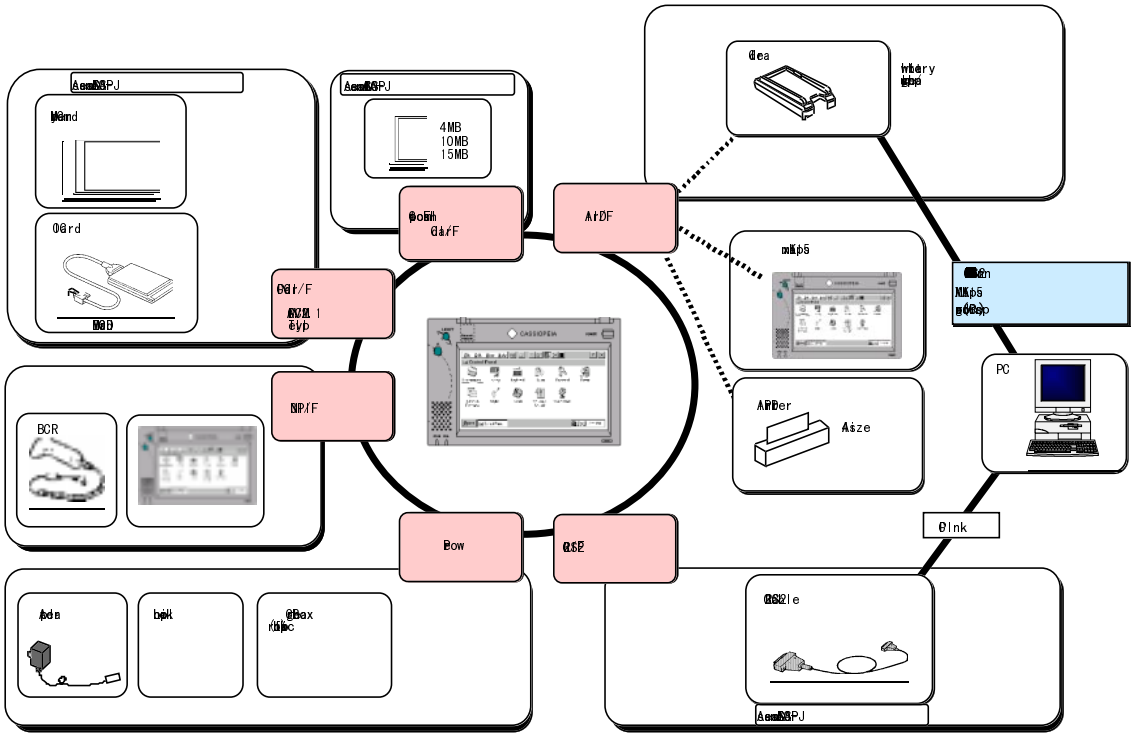
1.3.1 Hardware

Size	179 mm (W) x 107 mm (D) x 21 mm (H)
Weight	Approx. 370 g
Battery	Lithium-ion battery pack (main battery) Alkaline batteries (LR6 x 2) can also be used as substitution. CR2032 x 1 + IVR2430 x 1 (sub-battery)
Operating hours	Lithium-ion battery pack Approx. 10 hours (adequate for 90 Pocket Word strokes/minute) or Approx. 15 hours in “10:1” mode Alkaline batteries LR6 x 2 Approx. 10 hours (adequate for 90 Pocket Word strokes/minute) or Approx. 25 hours in “10:1 “ mode

1.3.2 System

OS	: Windows CE US Version 2.0
PC Card	: Conforms to PC Card Standard, Type II slot x 1
CF Card	: Compact Flash Card Slot x 1
Connection with PC	: RS-232C I/F, 16-pin connector, Max. 115.2 Kbps
Connection with conventional products	: 3-pin connector, Max. 38.4 Kbps
Infrared communication	: Conforms to IrDA 1.0, Max. 115.2 Kbps

Fig. 1.2 System Configuration



1.3.3 Basic Specifications

CPU

- Hitachi 32-bit RISC
- Maximum operating frequency: 80 MHz

Memory

- System ROM: Mask ROM: 16 MB (OS: 8 MB x 2) (note)
- System RAM: DRAM: 8 MB

Note:

PA-2500 incorporates 8 MB (OS: 4 MB x 2)

Display Unit

- Number of pixels : 480 x 240 (0.275 mm / pitch)
- Touch panel : Analog resistance membrane (non-glare)
- Gradation : 4-level grayscale (with backlight function)
- Contrast adjustment : Hardware control + temperature compensation (by builtin hardware control)
- Font : True Type font
  Arial, Courier New, Symbol, Tahoma, Times new roman

Application Software

- PIM

  Calculator, World Clock, Calendar (Schedule)

  Pocket Word, Excel, Explorer, PowerPoint

  Contacts, Tasks
- Browser/Communication

  Pocket Internet Explorer, Mail
- CD-ROM (by Microsoft Corporation)

  Mobile Devices (Ver2.0 H/PC Explorer)

  LAN driver conforming to NDIS standard

  Schedule PLUS
- Other

  Various application software, including Sound-Vega (by CASIO), recognition software by ART, and a software by CIC are supported.

  As in Ver1.01, the I/O startup, FLCE, and FCHKCE utilities are supported.

  (However, BCD calculation is not supported.)

  Hand-writing recognition software (“smARTwriter” by ART) is supported also.

1.3.4 Option

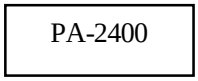
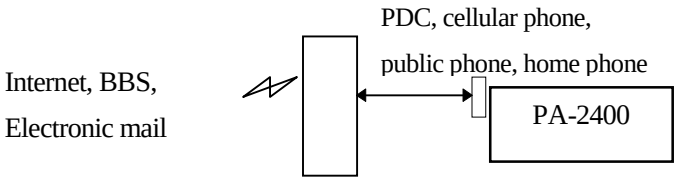
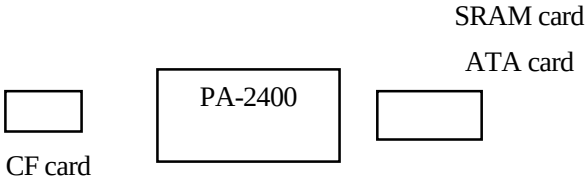
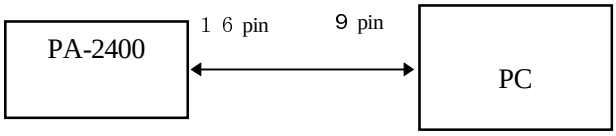
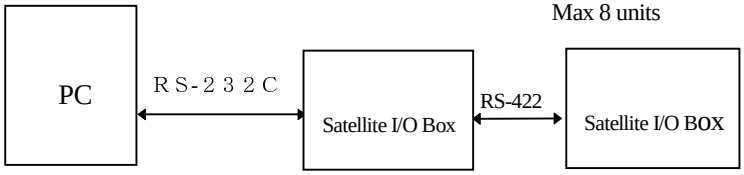
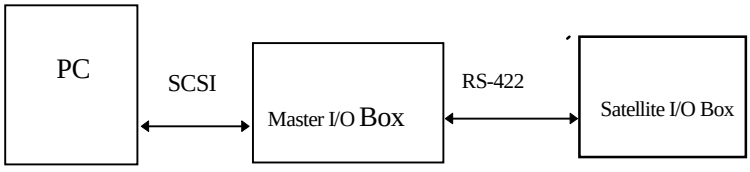
Recommended options for PA-2400 can be found on the Microsoft Web pages or by information available from Casio.

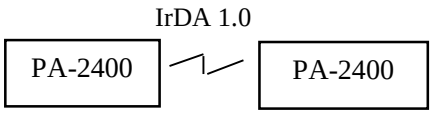
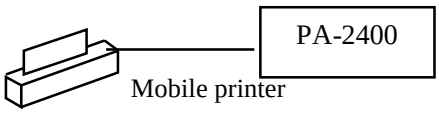
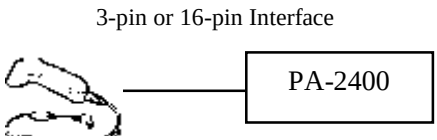
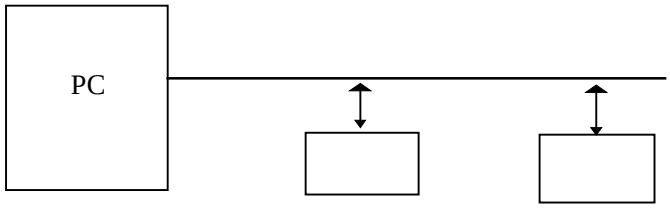
The user assumes all responsibility for the use of optional products with the PA-2400 not recommended by Casio nor by Microsoft.

2. Operation

2.1 System Configuration

Table 2.1 Typical System Configuration

Operation Mode	System Configuration	Use of System
Standalone		
With MODEM Card		Program and data transmission
With SRAM card , ATA card and CF card		Program and data transmission
Connection between PA-2400 and PC via RS-232C		Program and data transmission
Connecting I/O Box (Daisychain connection for Satellite I/O Box)		Program and data transmission
Connecting I/O Box (Daisychain connection for Master and Satellite I/O Box)		Program and data transmission

Operation Mode	System Configuration	Use of System
PA-2400 and PA-2400 via IrDA		Program and data transmission
With mobile printer		Report print
With 3-pin (BXT-5040), or 16-pin BCR		Barcode input
With LAN Card		Network IntraNet

3. Bootup Procedure

3.1 Bootup Method

The PA-2400 (Windows CE, Ver 2.0) will boot up in one of the following three ways:

Cold-bootup Start

If no data is stored in Object Store (e.g. if the sub-battery is being replaced) and after the diagnosis program has been executed, a Power-ON start from "Power-On factor" will initialize Object Store, boot the OS, make user setups, and execute Welcome Wizard.

1) Initialization of hardware
2) Initialization of Object Store
3) Booting up Windows
4) User setup
5) Execution of Welcome Wizard

Warm-bootup Start

Press RESET SW to cancel the resume function, then boot up the Windows CE to execute an application software.
In this case the Objective Store data is retained.

1) Booting up the Windows CE
2) Execution of application (An application in the start-up folder will be executed.)

Resume Start

This is a Power-ON start because the "Power-On factor" was used once after the OS was booted up. This continues execution of the same application that was running when the system was turned off. (The default setting of start-up is set to “Resume mode”.)

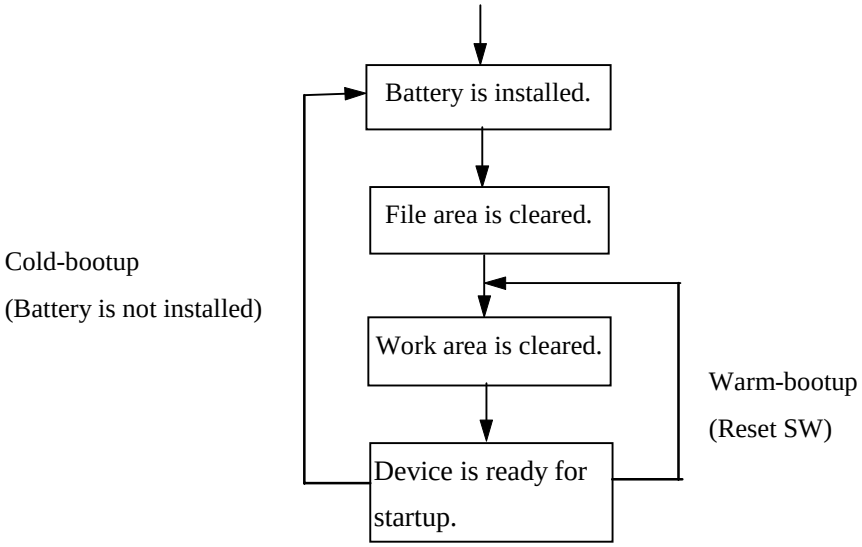


Fig. 3.1 Bootup Process

3.2 Bootup with Special Key Sequence

To aid maintenance or application development the following functions can be initiated depending on simultaneous key and switch operation.
In case the bootup is done by this method, the RESET SW should be pressed last.

Table 3.1 Types of Bootup

Function	Notification SW	LIGHT	RESET SW	POWER	Remark
Cold bootup	O	-	O	-	With confirmation message
Diagnosis program	O	O	O	-	
Memory dump	-	O	O	-	
Warm bootup	-	-	O	-	

Results from the diagnosis program or memory dump operation described above are outputted via the 3-pin interface. Therefore, these results can be examined on a PC which is connected via the interface of PA-2400.

4. Power Control

4.1 Power-ON Factors

Power-on factors include:

- The power is turned on by pressing the POWER SW.
- The power is automatically turned on at the specified time by the alarm function.
- The power is automatically turned on if the CD signal is detected by the PA-2400 connected to PC via the RS-232C cable.
- The power is automatically turned on when the PA-2400 is mounted on I/O Box. (This function is not supported for the PA-2500.)
- If the power is supplied from the I/O Box, the detection on which the PA-2400 is being mounted on I/O Box can turn on the power. The APO and POWER SW functions are operable while the PA-2400 is supplied with power from the I/O Box.
- The power is turned on by pressing the Notification button.

4.2 Power-ON Disable Factors

The following conditions are checked before the power is turned on. If any of the following conditions exist, the power is not turned on.

- If the main battery voltage is too low for the PA-2400 to be booted up.
- If the battery lock is not secured.
- If the compact flash card cover is off.

4.3 Power-OFF Factors

Power-off factors include:

- The power is turned off by pressing the POWER SW if the power is on.
- The power is automatically turned off, as specified in program setup, if any operation (key operation, touch panel operation, disk operation, card access, or communication) is not performed in a given period of time. This is called the APO function.
- The power is automatically turned off if the main battery voltage is below the specified level.
- The power is turned off if the battery cover lock is released.
- Power is turned off if the compact flash card lock is released.

Note:

The screen on the PA-2400 changes to reverse if the power is turned off (only in the first case above). This is a unique feature for turning off the power safely, not to loose data. If the power key is turned off when, for example, a card is being accessed or other high-priority process is in progress, the screen temporarily changes to reverse. The actual power-off process will take place after the system enters the idle state.

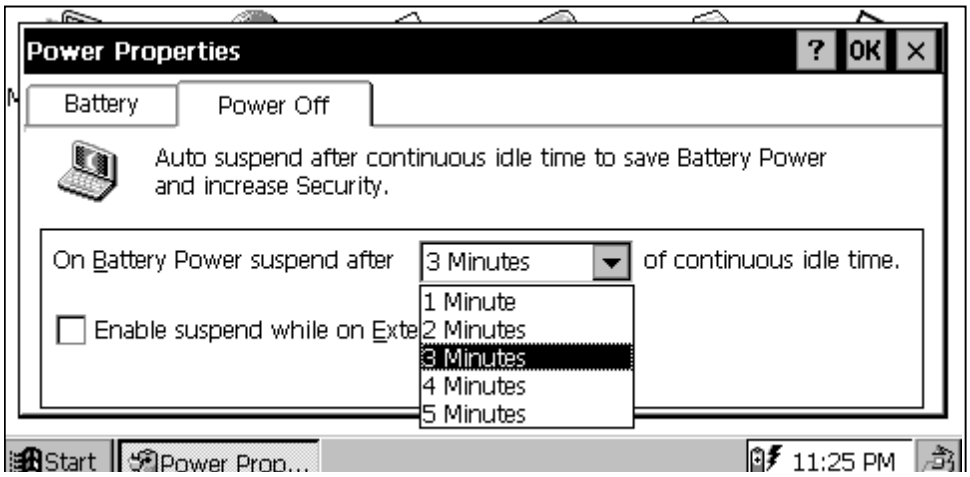
However, the user may not be aware of this happening unless the OS is executing a high-priority process at time of power-off.

4.4 Power Saving Process

Auto Power OFF (APO)

Automatically turns off the system if any action (key operation, touch panel operation, disk access operation, card access, or communication) is not performed in a given period of time. The software can set whether the APO function is enabled or disabled and the APO time. The APO time can be set to between 1 and 5 minutes, in 1 minute increments.

Fig. 4.1 APO setup screen

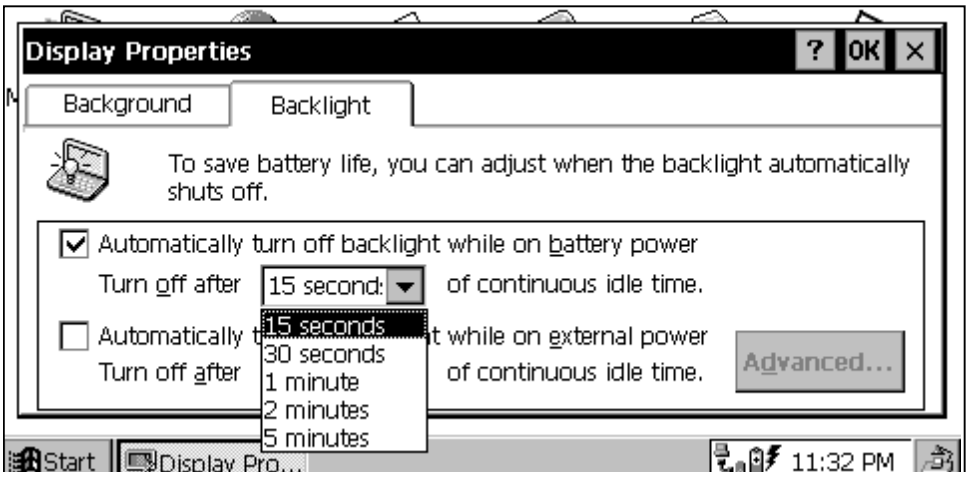


Auto Backlight OFF (ABO)

Automatically turns off the backlight if any action (key operation or touch panel operation) is not performed in a given period of time. The corresponding utility can be used to set whether the ABO function is enabled or disabled and the ABO time setup.

The backlight will also be turned off if a VDET1 event occurs.

Fig. 4.2 ABO setup screen



4.5 Low Battery Level Monitoring

On the PA-2400 there are three low battery levels.

Table 4.1 Battery voltage monitoring levels

Level	Contents	Operation	Next boot-up
VDET1	Low main battery voltage alarm	Indicates low main battery voltage alarm	---
VDET2	Power off due to low main battery voltage	Turns off the power.	Resume
VDET3	Low sub-battery voltage alarm	Indicates low sub-battery voltage	---

4.6 Low Battery Voltage Alarm Indication

The following alarm screen appears if the main battery or sub-battery voltage drops.

Fig. 4.3 Low main battery voltage alarm screen

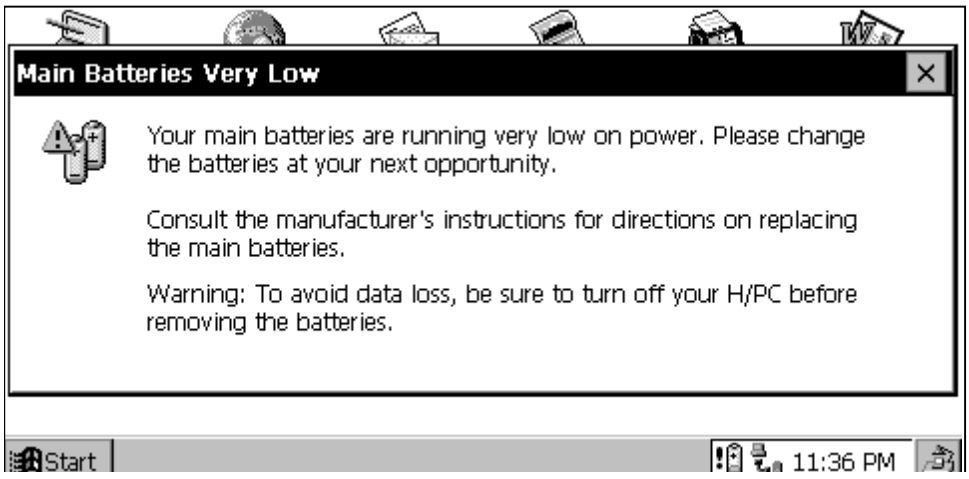
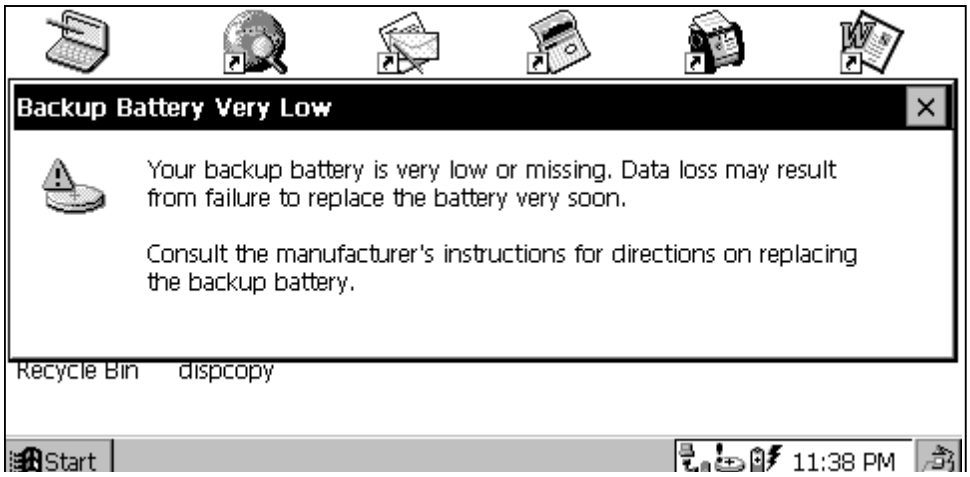

Main Batteries Very Low
Your main batteries are running very low on power. Please change the batteries at your next opportunity.
Consult the manufacturer's instructions for directions on replacing the main batteries.
Warning: To avoid data loss, be sure to turn off your H/PC before removing the batteries.
Start
11:36 PM

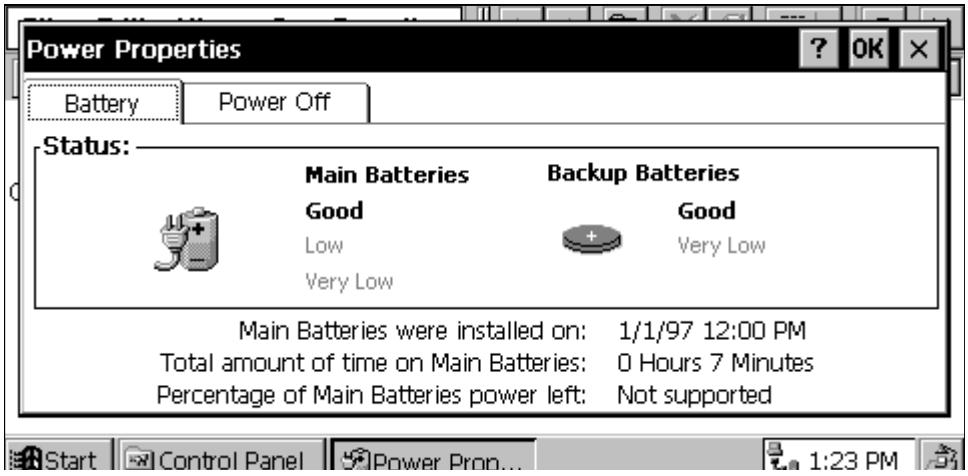
Fig. 4.4 Low sub-battery voltage alarm screen


Backup Battery Very Low
Your backup battery is very low or missing. Data loss may result from failure to replace the battery very soon.
Consult the manufacturer's instructions for directions on replacing the backup battery.
Recycle Bin
dispcopy
Start
11:38 PM

4.7 Remaining Battery Voltage Indication

The remaining battery voltage can be displayed if the Power Management icon or Battery icon is touched on the Control Panel.

Fig. 4.5 Battery property display screen



Note:

The "LOW" indication also appears if a VDET1 event occurs, even if it occurs when the backlight is on. If the voltage is "Low" or "Very Low" the backlight can not be restored to ON.

If the battery condition is reset by turning the power on and off, the "LOW" indication will be canceled.

4.8 Recharging and Power Supply

The main battery (lithium-ion battery pack) can be recharged in three ways as follows:

- Replace with a fully charged lithium-ion battery pack. Remove the battery pack and charge it using the battery charger (PA-2040DCHG-E).
- Set the battery pack in the PA-2400, then mount the PA-2400 on the I/O Box to charge the battery pack..
- Retain the battery pack in place of the PA-2400, then connect the AC adaptor (AD-C50200-S) to the PA-2400.

Data security at battery replacement is described below.

As long as either the main battery or sub-battery is installed, the data in Object Store is retained.

Table 4.2 Data security depending on battery presence

Installed battery	Data in Object Store
Main and sub-batteries	Retained
Only main battery	Retained
Only sub-battery	Retained
No battery	Can not be retained

5. List of Software Available

Category	Software	Location	Remark
OS	Windows CE	ROM	US Version 2.0
Preinstalled AP	PocketWord	ROM	PocketWord
	PocketExcel	ROM	PocketExcel
	PocketExplorer	ROM	PocketExplorer
	PocketPowerPoint	ROM	PocketPowerPoint
PIM	Calculator	ROM	Calculator
	World Clock	ROM	World-time clock
	Calendar	ROM	Calendar
	Contacts	ROM	Address book
	Tasks	ROM	Scheduler
	PocketIE	ROM	Pocket Internet Explorer
	InternetMail	ROM	Internet mail
	Terminal	ROM	Terminal client software
Utility	Bootup from I/O Box	ROM	Detection of PA-2400 being mounted on I/O Box
	FLCE	RAM	File transfer (via I/O Box, between PA-2400s)
	FCHKCE	RAM	Transferred file checks
	SIPanel	RAM	SI panel library
AP	smARTkeyboard	ROM	SI panel
	smARTwriter	ROM	Handwriting recognition
	smARTvoice	ROM	Voice recognition
	QuickNotes	ROM	Handwriting memo
	Sound-Vega	ROM	Voice recognition
Host Utility	LMWIN	PC	Communication program resided in PC (WIN95)
	LMDOS	PC	Communication program resided in PC (DOS)
	Mobile Devices	PC	PA-2400-to-PC link software (NT4.0, WIN95)

PIM : Personal Information Management

6. Input Method

6.1 Key Input

The names and functions of Ver 1.01 keys have been modified, as follows:

Table 6.1 Comparison

Ver1.01	Ver2.0
LIGHT (Backlight ON/OFF) CALIB (Calibration Start)	SIP (Software Input Panel ON) LIGHT (Backlight ON/OFF) SIP+LIGHT (Calibration Start)

The SIP key toggles between ON and OFF.

6.2 Alphanumeric Input Pad

This software-type input pad can be initiated if the icon in the task bar is touched.

- Alphanumeric input pad

Fig. 6.1 Alphanumeric input pad (with Shift key not pressed)

Fig. 6.2 Alphanumeric input pad (with Shift key pressed)

Fig. 6.3 Alphanumeric input pad (with Number key pressed)

7. Fonts

Only true type fonts can be used.

It is possible to add more font types to the pre-installed fonts. To do this, use Mobile Devices to download the font from the Windows＼Fonts directory on the PC to the PA-2400. This operation converts the original font via the font filter to a format that can be used on the PA-2400.

After download, switch to the desired font on the PA-2400.

Table 7.1 Fonts

Item	Contents	Remark
Font type	Pre-installed true type fonts : Arial Courier New Symbol Tahoma Times New Roman	
Size	8 to 36 points selectable	

8. Registry

The following list shows the registry values that have special meanings on the PA-2400.

- Default of SIP key
  [HKEY_LOCAL_MACHINE＼Software＼Apps＼SIPManager]
  "SIPExeName"="smARTkbd.exe"
  "SIPQuitOpt"="/q"

- Default of CalibrationData
  [HKEY_LOCAL_MACHINE＼HARDWARE＼DEVICEMAP＼TOUCH]
  "CalibrationData"="500,510 860,175 860,840 140,840 140,175 "

- Method used to resume the screen (redraw not performed)
  [HKEY_LOCAL_MACHINE＼SYSTEM＼GWE]
  "PORepaint"=dword:0

- Keyboard status
  [HKEY_LOCAL_MACHINE＼HARDWARE＼DEVICEMAP＼KEYBD]
  "Status"=dword:9

- Defaults of Control Panel and Keyboard properties
  [HKEY_CURRENT_USER＼ControlPanel＼Keybd]
  "RepeatRate"=dword:10
  "DispDly"=dword:10
  "InitialDelay"=dword:226

- Execution of Sound-Vega with Modification button
  [HKEY_LOCAL_MACHINE＼Software＼Microsoft＼Shell＼Keys＼408A]
  "Default"="＼＼windows＼＼Vega-Jr.exe"

9. Application Development Environment

9.1 Overview

User applications may be developed under the following development environment.

Table 9.1 Application development environment

Development platform	Microsoft Windows NT4.0 (English version)
Development language	Microsoft Visual C++ Ver5.0 + VC for Windows CE (US Ver2.0 SDK/DDK) Microsoft Visual Basic Ver5.0 + VB for Windows CE (US Ver2.0 SDK/DDK) Microsoft Visual J++ Ver1.1 + VJ for Windows CE (US Ver2.0 SDK/DDK)

9.2 Software Development Procedure

Application program developers should follow the three steps shown below to develop and debug user programs.

- Emulation on PC

  Construct the user codes in the X86emu so that operation of the user program can be checked under the emulated Windows NT4.0 environment.

  Within this emulated environment most of the debugging tasks can be performed.

- Remote debugging

  Transfer the finished application program into an actual PA-2400 and debug it from the remote terminal.

- Operation check on actual PA-2400

  Check the operation of the finished application program by installing it, through the MSDEV integral environment or Mobile Devices, on actual PA-2400 and execute the program.

Flow-chart of Development Procedure

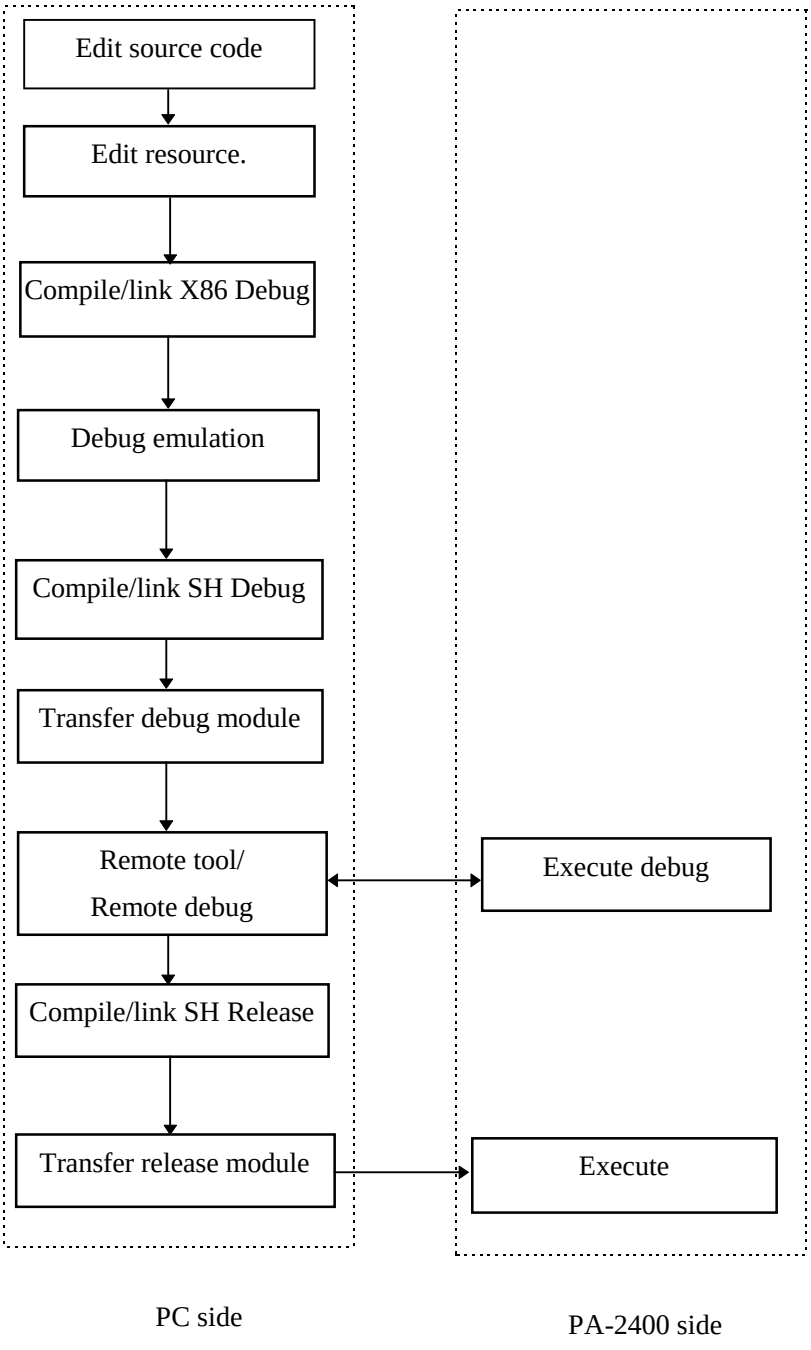


Fig. 9.1 Software development procedure

For more information refer to the Microsoft Visual C++ Ver5.0 and other reference manuals published separately for Windows CE.

10. Appendix

10.1 Differences from PA-2500 (US Ver.2.0)

Keyboard

The PA-2400 is not equipped with a hardware keyboard. Characters are input from the software input panel.

Calibration

Holding down the SIP and LIGHT keys simultaneously initiates the calibration.
(To quit this operation, touch anywhere on the screen.)

Power supply terminal

The power supply can be started by simply mounting this PA-2400 on the I/O Box.

Bootup from I/O Box

The PA-2400 can boot up if it is simply mounted on the I/O Box (only if the I/O Box is supplied with power).

Contrast adjustment

Use the wheel (Contrast Adjustment Dial) on the left edge of the unit to adjust the screen contrast.

Software input panel

The software input panel can be turned on and displayed if the SIP button is pressed or if the corresponding icon is touched (only with alphanumeric input key pad).

Welcome Wizard

The operation method of the Welcome Wizard, which is initiated with a cold bootup, has been modified.

FuncKey

The PA-2400 does not have the FuncKey.EXE-related files installed.

Power OFF key

The Power OFF key functions differently (refer to page 14). The internal data process at time of the power off is different.